

What is claimed is:

1. A multiple liquid foamer, comprising:
a foamer pump defining a pump chamber, the foamer pump including
5 a plunger slidably received in the pump chamber to pump a gas,
a first liquid pump coupled to the plunger to pump a first liquid in unison
with the plunger, and
a second liquid pump coupled to the plunger to pump a second liquid in
unison with the plunger; and
10 wherein the foamer pump defines a mixed liquid passage that is fluidly coupled to
the first liquid pump and the second liquid pump, the mixed liquid passage being
constructed and arranged to mix the first liquid from the first liquid pump and the second
liquid from the second liquid pump to form a mixed liquid;
wherein the foamer pump defines a gas passage in which the gas from the pump
15 chamber is pumped; and
wherein the gas passage intersects the mixed liquid passage to create foam with the
mixed liquid and the gas.
2. The foamer of claim 1, wherein the second liquid pump is positioned inside
20 the first liquid pump to reduce the overall size of the foamer pump.
3. The foamer of claim 2, wherein:
the second liquid pump includes
an inner tube defining an inner piston chamber, and
25 an inner piston member slidably received in the inner piston chamber to
pump the second liquid; and
the first liquid pump includes
an outer tube surrounding the inner tube, the outer tube and the inner tube
defining an outer piston chamber, and

an outer piston member slidably received in the outer piston chamber to pump the first liquid.

4. The foamer of claim 3, wherein:

5 the second liquid pump includes

an inner inlet valve to permit inflow of the second liquid into the inner piston chamber, and

an inner outlet valve to permit outflow of the second liquid from the inner piston chamber; and

10 the first liquid pump includes

an outer inlet valve to permit inflow of the first liquid into the outer piston chamber, and

an outer outlet valve to permit outflow of the first liquid from the outer piston chamber.

15 5. The foamer of claim 4, wherein:

the inner piston member defines an inner outlet opening;

the inner outlet valve includes an inner sliding seal slidably received around the inner piston member to selectively open and close the inner outlet opening;

20 the outer piston member defines an outer outlet opening; and

the outer outlet valve includes an outer sliding seal slidably received around the outer piston member to selectively open and close the outer outlet opening.

6. The foamer of claim 5, wherein:

25 the second liquid pump includes an inner retainer coupled to the inner tube for closing the inner sliding seal over the inner outlet opening when the inner piston member is in a retracted position; and

the first liquid pump includes an outer retainer coupled to the outer tube for closing the outer sliding seal over the outer outlet opening when the outer piston member is in a retracted position.

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7. The foamer of claim 6, further comprising a spring engaged against the inner retainer to bias the inner piston member in the retracted position.

5 8. The foamer of claim 2, wherein the first liquid pump and the second liquid pump are concentrically arranged.

9. The foamer of claim 2, further comprising a container coupled to the foamer pump.

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10. The foamer of claim 9, wherein:
the container includes a divider wall that defines a first compartment in which the first liquid is stored and a second compartment in which the second liquid is stored;
the first compartment and the second compartment are positioned in a stacked
15 relationship; and
the container includes a feed tube that extends from the second compartment and that is coupled to the second liquid pump to supply the second liquid.

11. The foamer of claim 1, wherein the first liquid pump and the second liquid
20 pump extend in a side by side relationship.

12. The foamer of claim 1, further comprising a mesh member positioned in the foamer pump to refine the foam.

25 13. The foamer of claim 1, wherein the gas passage includes a convoluted passage with one or more turn portions to increase turbulence of the gas.

14. The foamer of claim 1, further comprising a valve plate coupled to the plunger, the valve plate including an inlet valve configured to permit inflow of the gas

into the pump chamber and an outlet valve configured to permit outflow of the gas from the pump chamber.

15. The foamer of claim 1, wherein at least a portion of the mixed liquid
5 passage is defined at least in part by a mixer insert.

16. The foamer of claim 15, wherein the mixer insert defines one or more
mixer channels that circumferentially extend around the mixer insert and one or more
connector channels that extend longitudinally along the mixer insert.

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17. The foamer of claim 1, further comprising a spout connected to the plunger
to dispense the foam.

18. The foamer of claim 1, wherein the gas passage and the mixed liquid
15 passage transversely intersect to enhance foaming of the foam.

19. The foamer of claim 18, wherein the gas passage and the mixed liquid
passage intersect in an orthogonal manner.

20. The foamer of claim 1, further comprising a container coupled to the
foamer pump.

21. The foamer of claim 20, wherein:
the container includes a divider wall that defines a first compartment in which the
25 first liquid is stored and a second compartment in which the second liquid is stored;
the first compartment and the second compartment are positioned in a stacked
relationship; and
the container includes a feed tube that extends from the second compartment and
that is coupled to the second liquid pump to supply the second liquid.

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22. The foamer of claim 20, wherein the container includes a first bladder coupled to the first liquid pump to supply the first liquid.

23. The foamer of claim 22, wherein the container includes a second bladder
5 coupled to the second liquid pump to supply the second liquid.

24. The foamer of claim 22, wherein the container includes a supply tube to supply the second liquid contained around the first bladder.

10 25. The foamer of claim 20, further comprising a vent seal positioned between foamer pump and the container to vent the container.

26. The foamer of claim 1, wherein the foamer pump includes an inverted foamer pump constructed and arranged to dispense the foam from an inverted position.
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27. The foamer of claim 26, wherein the inverted foamer pump includes a shroud member covering the second liquid pump to draw the second liquid into the second liquid pump.

20 28. The foamer pump of claim 26, wherein the first and second liquid pumps each include an umbrella valve for controlling flow of the first and second liquids into the first and second liquid pumps.

29. The foamer pump of claim 1, wherein the first liquid pump includes a
25 piston tube that defines a piston chamber, a piston slidably disposed in the piston chamber, an inlet valve and an outlet valve.

30. The foamer pump of claim 29, wherein inlet valve includes a ball valve disposed at one end of the piston tube.

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31. The foamer pump of claim 29, wherein inlet valve includes an umbrella valve disposed at one end of the piston tube.

32. The foamer pump of claim 29, wherein the outlet valve includes an outlet opening defined in the piston and a sliding seal slidably received around the piston to open and close the outlet opening.

33. The foamer pump of claim 32, wherein the first liquid pump includes a retainer coupled to the piston tube.

34. An apparatus, comprising:
a pump assembly constructed and arranged to couple to a container, the pump assembly including
a first liquid pump constructed and arranged to pump a first liquid from the container, and
a second liquid pump disposed inside the first liquid pump to reduce space occupied by the pump assembly in the container, the second liquid pump being constructed and arranged to pump a second liquid from the container; and
wherein the pump assembly defines a mixed liquid passage coupled to the first liquid pump and the second liquid pump in which the first liquid and the second liquid are mixed to form a mixed liquid.

35. The apparatus of claim 34, wherein:
the pump assembly defines a pump chamber;
the pump assembly includes a plunger received in the pump chamber to pump gas from the pump chamber; and
the pump assembly defines a passage in which the mixed liquid and the gas are combined to form foam.

36. A multiple liquid foamer, comprising:

means for manually pumping a first liquid;

means for manually pumping a second liquid;

means for mixing the first liquid and the second liquid to form a mixed liquid; and

5 means for manually pumping a gas into the mixed liquid in unison with said means
for manually pumping the first liquid and said means for manually pumping the second
liquid to create foam.

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